The risk of moving – using risk analysis to develop simulation centre policy

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SUMMARY

A risk analysis tool was utilised to facilitate the development of a pragmatic and effective moving and handling Standard Operating Procedure (SOP) specific to the medical education simulation centre environment. The tool that fits the purpose was a Failure Modes Effect Analysis (FMEA), which enabled a proactive and collaborative risk assessment process to occur, thereby fostering a culture of safety.

KEYWORDS

Failure Mode Effects Analysis, Moving and Handling, Policy development

Purpose

Safety is at the heart of simulation, and yet, as Lambert et al. (2025) identify, the inherent risks of medical education simulation centre activities are often overlooked or forced into generic clinical service policies. Whilst there are many parallels with the clinical environment, the medical education simulation centre has inherent and unique risks. Lambert et al. (2025) propose that key areas of risk, such as moving and handling and sharps safety, would benefit from the use of a proactive risk-management tool to devise policies and procedures that improve safety and safety culture for all within the centre, with the potential for these improvements to transition into clinical spaces.

Currently, the medical education simulation centre lacks a specific moving and handling SOP that could identify ergonomic risk factors that may cause harm to people, the environment, or resources within the centre. A secondary benefit of addressing this issue is the role-modelling of a truly embedded safety culture; by seeking to improve our own safety culture, we also promote this to the learners engaging with the centre.

It is observed within the wider healthcare field that minimising risk to patient safety is a key priority, but as McLeod and Bowie (2020) identified, the health service still lags behind other high-risk industries in how it proactively manages risk for all people involved. Failure Mode Effect Analysis (FMEA) was selected as a proactive risk-analysis tool that facilitates a structured and collaborative approach to identifying systemic risks associated with moving and handling within the simulation centre (IHI, 2017). By examining systems and processes, the emphasis was removed from the individual to mitigate any sense of blame, and to encourage an open and transparent conversation allowing the identification of the real risks within each process (McKay et al. 2025). It was felt that early stakeholder involvement would support the development of an effective Standard Operating Procedure (SOP) through enhanced ownership, and FMEA enables this (IHI, 2017). Although FMEA has been utilised in healthcare for around 25 years, there is little evidence of its use for healthcare-associated moving and handling policies specifically, and therefore a lack of supportive literature for its use in this context.

Completion of the FMEA was divided into two phases. First, the identification of failure modes and effects was facilitated by the development of process maps. The second phase involved assigning a Risk Profile Number (RPN) to each failure mode to determine severity and allow the allocation of resources to the highest-priority areas. The literature highlights the proactive nature of FMEA as its most valued feature in healthcare settings (Askari et al., 2017). In view of this, we collaboratively used FMEA to proactively support the design of a moving and handling SOP that truly reflects the nature of work within the medical education simulation centre environment.

Approach

As a medical education simulation centre team, we held four one-hour sessions attended by a multi-professional group comprising members of the administration team, simulation technicians, and clinical skills specialists. Involving a range of staff was essential to ensure a collective process and to capture the lived experiences of different professional groups, given the inherent variation in their tasks. At the start of each session, a brief explanation of the FMEA tool and its relevance to creating a moving and handling policy was provided to foster ownership. The group members determined the agenda and identified aspects of moving and handling within the simulation centre to prioritise, with final prioritisation resting with the project lead. Individuals participated at points most relevant to their roles.

The predominant part of each session involved a virtual walk-through and talk-through of the processes identified by the team (NES, 2024). We explored current practice with curiosity, maintaining an open and enquiring mindset, without judgement. Establishing "work as done" was imperative, bringing a compassionate lens to recognise existing good practice and the value of variability, which should be embraced as an indispensable asset rather than a liability (Hollnagel & Dekker, 2024).

The outcomes of these discussions were developed into process maps, with each sub-task identified. Presenting tasks and processes graphically enabled clearer engagement and easier identification of sub-tasks. Figure 1 demonstrates the process map devised for one of the most frequently undertaken tasks within the simulation centre.

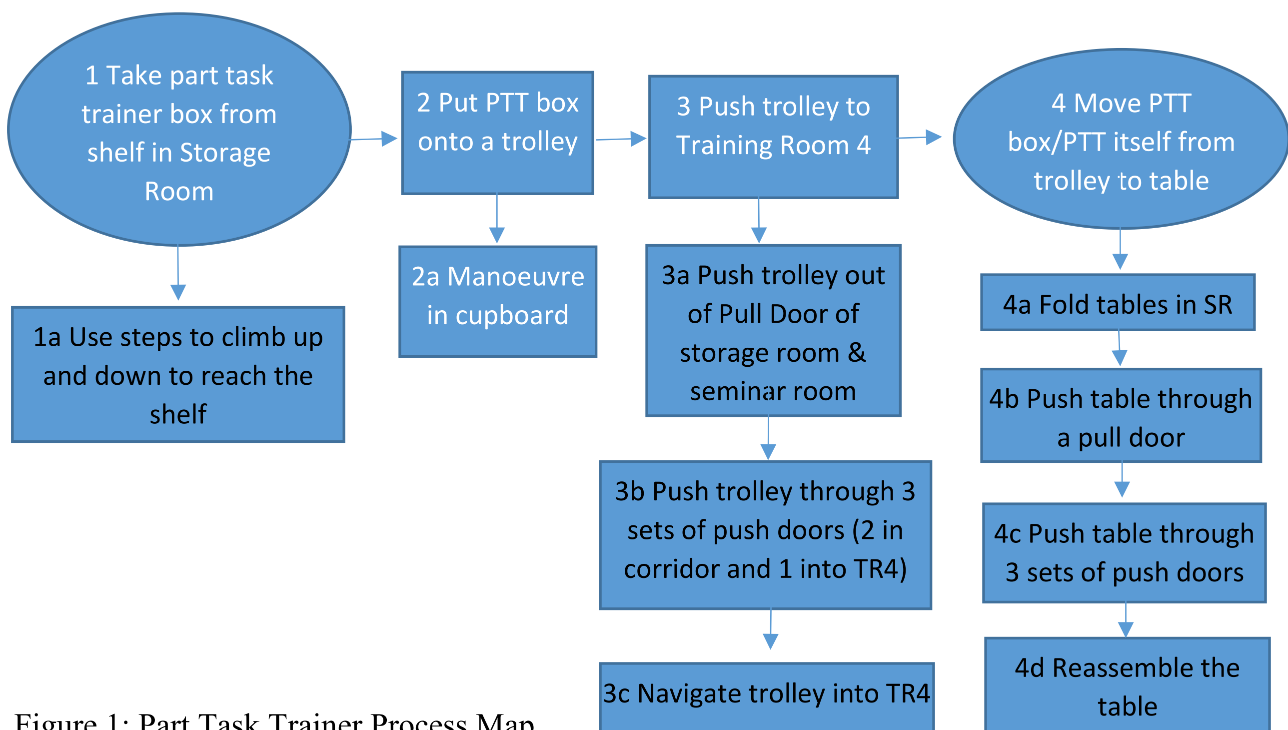

Figure 1: Part Task Trainer Process Map

This map was then used to populate an FMEA template with corresponding failure modes and effects for each sub-task. Many processes shared common risks, causes, and effects. Figure 2 shows the FMEA template corresponding to the Part Task Trainer process map.

Failure Modes and Effects Analysis (FMEA)			
Part Task Trainer Process			
Steps in the process	Failure Mode	Failure Cause	Failure Effect
1	Drop the PTT box	Weight of boxes unknown	Damage the PTT/ Injury to staff - box fall on staff or twist/strain injury
1	Drop the PTT box	Differing width and depth of box, awkward shape	Damage the PTT/ Injury to staff - box fall on staff or twist/strain injury
1	Drop the PTT box	Design of handle on boxes - can swing	Damage the PTT/ Injury to staff - box fall on staff or twist/strain injury
1	Drop the PTT box	PTT box not properly closed	Damage the PTT/ Injury to staff - box fall on staff or twist/strain injury
1a	Fall from step	Carrying load up and down step	Injury to staff/ Damage to PTT
1a	Fall from step	Steps difficult to move	Strain/jarring injury trying to move the steps
2	Trolley moves when trying to put box onto it & boxes fall	No brakes on trolley (most trolleys) so they can move away when trying to place box on	Injury to staff/ Damage to PTT
2	Unable to move box onto trolley	Trolley shelf heights are fixed	Injury to staff/ Damage to PTT
2	Unable to move box onto trolley	Access to bottom shelf of trolley is restricted	Injury to staff/ Damage to PTT
2	Unable to move box onto trolley	Need to lift box up to pace it onto the trolley, the handles/grip/weight can make this hard	Injury to staff/ Damage to PTT
2a	Restricted space to move so unable to put PTT box onto trolley	Volume of kit in limited space	Damage to other kit/ damage to PTT box/ injury to staff from knocks or strains
3	Unable to push/move trolley	Wheels stick	Strain to staff --> injury
3a	Unable to pull door open door and move trolley through	Limited space	Over reaching strain to staff
3a	Unable to pull door open door and move trolley through	Need to pull door open, hold it open and move trolley through	Over reaching strain to staff
3b	Unable to push door and keep them open when moving trolley through so cannot move PTT to desired location	Need to push door open, hold it open and move trolley through	Strain to staff --> injury/ run over toes
3b	Unable to push door and keep them open when moving trolley through so cannot move PTT to desired location	Need to push door open, hold it open and move trolley through	Damage to doors/ walls
3b	Unable to push door and keep them open when moving trolley through so cannot move PTT to desired location	Lack of door stops and clarity around rules re holding open fire doors	Damage to doors/ walls/ injury to staff
3b	Unable to push door and keep them open when moving trolley through so cannot move PTT to desired location	Pin doors open then interupted in completion of task	Fire doors not closed and fire so would not achieve function of restricting fire
3c	Difficulty manouvering into TR 4 with loaded trolley	Inconsistent set up of TR 4 - patitions/trolleys in the way	Damage to doors/walls/trolley/other equipment/ injury to staff/ run over toes
3c	Knock PTT box off trolley	Inconsistent set up of TR 4 - patitions/trolleys in the way	Damage to PTT
4	Drop the PTT box	Weight of boxes unknown/ differing sizes & shapes of PTT boxes/ design of handles	Damage to PTT/ injury to staff - crush toes
4	Drop the PTT box as table tilts unexpectedly	Table not fully secured when reassembled flat and flips when weight of box put on it	Damage to PTT as thrown to floor/ injury to staff from box or PTT hitting then
4	Drop the PTT box as table moves unexpectedly	Table brakes fail/ ineffective/broken and it moves away as box/PPT out onto it	Damage to PTT as lands on floor/ injury to staff from box or PTT
4a	Unable to fold tables	Screws holding tables assembled and flat threaded & unable to unscrew	Move the table assembled -> difficult to move through doors ->Injury to toes/Strain injury/Damage to walls/doors
4a	Folded table falls as being folded	Table suddenly collapses	Crush injury to food/ damage to table edge
4b	Unable to open pull door and move table through so unable to relocate tables	Need to pull door open, hold it open and push/pull table through	Strain injury to staff/ run over toes/ damage to doors/ damage to tables
4b	Unable to push/pull the table so unable to relocate it	Table wheels stick and do not run smoothly	Strain injury to staff
4b	Unable to push/pull the table so unable to relocate it	Folded tables fit through doors but awkward to manouver	Strain injury to staff/ run over toes/ damage to doors/ damage to tables
4b	Unable to push/pull the table so unable to relocate it	Lack of staff so moving tables on own	Strain injury to staff & fatigue from moving six tables
4b	Staff slip when moving tables	Wet floors from cleaning - if setting up/clearing staff at time of day centre being cleaned	Staff falling --> injury
4c	Unable to open push door, hold it open and move table through so unable to relocate tables	Need to pull door open, hold it open and push/pull table through	Strain injury to staff/ run over toes/ damage to doors/ damage to tables
4d	Unable to reassemble the table from folded to flat so unable to use	Unable to screw the table back into assembled position due to threaded screws	Injury to fingers/ unable to set up PTT if not enough tables ->inadequate set up

Figure 2: Part Task Trainer FMEA Template

In the spirit of continued collaboration, the completed FMEA template was returned to all team members who participated in any session so they could independently rank rates of occurrence, severity, and detectability, and calculate an overall RPN for each failure mode. The intention was to take an average of these responses to democratically determine the most significant risks and inform resource allocation. However, despite the value of capturing variability in practice, this proved challenging due to participants' unfamiliarity with the scoring system and the complexity of applying it independently. To overcome this barrier, the group reconvened to generate RPNs collaboratively, enabling consensus. Figure 3 represents the collated PRN for the Part Task Trainer Process.

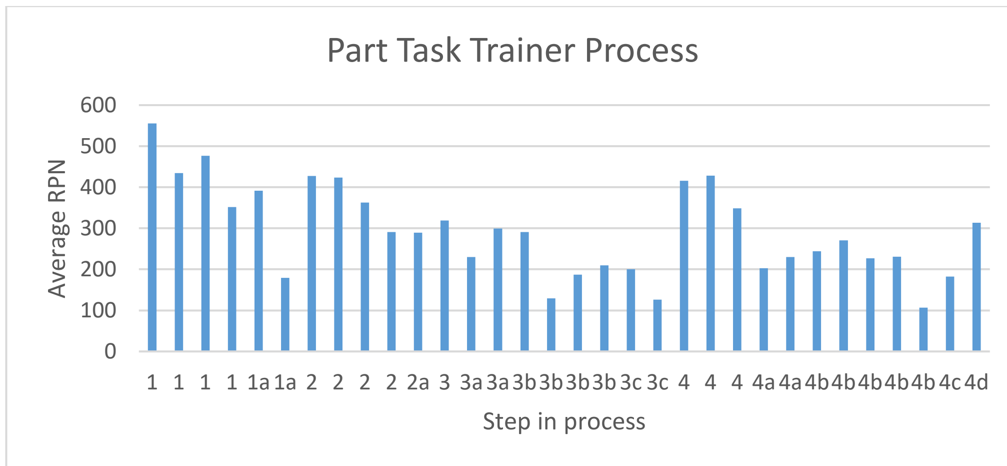

Figure 3: Collated RPN for PTT Process

Key Learning

The use of a risk analysis tool in the form of the FMEA provided valuable guidance to a novice team developing a moving and handling SOP. While it effectively supported the initial collaborative walk-through and talk-through of processes, engagement was harder to maintain during the RPN-scoring stage. The scoring system was complex for novices, and despite the intention for individuals to score independently, this was difficult to enact. Engagement reduced due to the perceived complexity and time-consuming nature of this step, likely exacerbated by the lack of comparable examples in the healthcare literature.

Despite this challenge, determining an RPN for each step in the processes facilitated effective risk prioritisation. The data was presented in a way that allowed for an at-a-glance visualisation of the process steps that posed the greatest risk. This prompted the team to preferentially allocate resources to these areas and to explore potential mitigation measures. Figure 4 demonstrates the RPN prioritisation and action plan for the Part Task Trainer process.

Steps in the process	Average RPN	Action/Solution
1	555.5	Label the boxes with the weight
1	434.5	Investigate if could use more uniform box designs
1	476.25	Source boxes with fixed handles
1	352	
1a	391.5	
1a	179	
2	427.25	Source trolleys with robust and easy to apply breaks
2	423.25	Source trolleys with variable height shelves
2	362.5	
2	290.5	
2a	289.5	
3	319.25	
3a	230.25	
3a	299.75	
3b	291	
3b	129.25	
3b	187.25	
3b	210	
3c	200.5	
3c	126.25	
4	416	Ensure the box is clearly labled with the weight
4	428.5	Introduce a checklist to ensure the tables are accurately assembled
4	348.5	
4a	202.5	
4a	230	
4b	243.75	
4b	270.75	
4b	226.75	
4b	231	
4b	106.75	
4c	182.25	
4d	313.5	

Figure 4: Risk Prioritisation & Action Plan

Developing a pragmatic and effective SOP requires a focus on *work as done* rather than *work as imagined* (Hollnagel & Dekker, 2024). Viewing SOPs through a rigid lens of *work as imagined*, expecting systems to function only through strict compliance, was not considered a solution for the team. Instead, this process fostered collaboration, and while assigning RPNs proved more complex than initially expected, the overall experience has been positive. Ultimately, it will result in an SOP that is relevant to the simulation centre, practical, and more likely to encourage concordance.

Practical Implications

Using FMEA provided a launch point for collaborative development of process maps through virtual walk-through/talk-through techniques. This ensured all voices were heard and allowed involvement from all stakeholders, ensuring an accurate reflection of how staff currently operate in terms of moving and handling within the simulation centre.

The proactive nature of FMEA provided a springboard for discussion, encouraging reflection on the people who use the simulation centre environment and the potential risks they face inherent to the simulation centre. It raised awareness of issues that may otherwise have been taken for granted, promoting stakeholder involvement and enhancing commitment to ensuring that the resulting SOP will make meaningful, practical impact rather than representing imposed policy change.

FMEA also helped identify not only where things may go wrong, but also practical solutions to mitigate risks. It demonstrated how systems could be adapted to make it easier to do the right thing and support the human within the task. Identified areas of good practice will be explored further to enhance shared learning and expand pockets of capacity.

SOPs must evolve over time, and review timelines will be clearly set to ensure the policy remains relevant and reflective of any changes to processes. Askari et al. (2017) promote the use of

continuous FMEA to re-evaluate RPNs, recognising that although it can be time-consuming, it supports a culture of proactive failure identification. Using FMEA can guide this review process and help sustain an enhanced safety culture now and into the future.

References

Askari, R., Shafii, M., Rafiei, S., Abolhassani, M. S., Salarikhah, E. (2017) Failure Mode and effect analysis: improving intensive care unit risk management processes. *International Journal of Healthcare Quality Assurance*, 30 (3), 208-215 DOI: 10.1108/IJHCQA-04-216-0053

Hollnagel, E., and Dekker, S. W. A. (2024). The ironies of 'human factors.' *Theoretical Issues in Ergonomics Science*, *26*(3), 349–359. https://doi.org/10.1080/1463922X.2024.2443976

Institute for Healthcare Improvement (2017) Patient Safety Essentials Toolkit: Failure Modes and Effects Analysis (FMEA). *Ihi.org*

Lambert, K. E., Leeson, B. G., Nilsson, S. M. and Oliver, N. G. (2025) Risk assessment processes within healthcare simulation centres: A scoping review. *Teaching and Learning in Nursing.* https://doi.org/10.1016/j.teln.2025.04.023

McKay, C., Innes, S. and Hope, J. (2025) Just culture in healthcare settings: A narrative review of implementation practices and outcomes. *Australasia Psychiatry,* 33(6), 941-948. doi:10.1177/10398562251382461

McLeod, R. W., and Bowie, P. (2020) Guidance on customising Bowtie Analysis for use in healthcare. *Contemporary Ergonomics and Human Factors*

NES (2024) Walt-Through-Talk-Through Analysis: Observation and Interview to better understand the complex reality 'Work-as-Done' in Health and Social Care. https://learn.nes.nhs.scot/78607 Accessed 16/02/26